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The assumption is often made that there must a conflict between the goals of the so-called Liberal Arts and those of career preparations in higher education. The perception of such a conflict has its origins far back in history; Aristotle in his *Politics* characteristically summarizes the issue: "The existing practice [of education] is perplexing; no one knows on what principle we should proceed -- should the useful in life, or should virtue, or should the higher knowledge, be the aim of our training; all three opinions have been entertained" (Book VIII, Chap 2, p. 321).

Centuries later, in the United States, the Harvards and Yales were founded to produce "gentlemen" while the agricultural colleges were established to produce better farmers (McGrath, 1959). During the 1930's and 40's Robert M. Hutchins promulgated the study of the classical "Great Books" as the essential core of higher education at the University of Chicago while John Dewey at Columbia University urged his students to interlock theory with practice (Rehnke, 1982-83).

Similar thoughts are certainly prevalent in some minds to this day, but we believe that few would successfully maintain that humanities and social science instruction is unnecessary in any modern and comprehensive professional curriculum. The time is now to move beyond such exaggerated dichotomies and consider the place of these disciplines and the ways of their presentation in contemporary educational practice.

Our thesis is presented in the form of research findings answering three important questions:

1. Are the effects on the students of exposure to such courses in humanities and the social sciences different in any measurable manner from effects obtained through maturation, social participation, group and institutional influences, occupational involvement and practice, and similar variables?

2. If there are different effects produced by humanities and social sciences courses, are they resulting from varying departmental structures and instructional regiments?

3. Are there differences in the learning styles of students oriented primarily toward subjects of natural science, technology, and practice from those of students whose orientation includes concerns traditionally subsumed under the vague rubric of "liberal arts"?

Our first question has had a multitude of answers [e.g., Faust, 1950; Dressel and Meyhew, 1954; Bloom, 1956; Barton, 1959]. Most recently a major study by Winter, McClelland, and Steward (1981) classified possible outcomes into proposed affective and cognitive results. They compared students from a liberal arts college, a teachers college, and a community college, testing the hypotheses that varying exposures to humanities and social science courses would produce differences in critical and independent thinking, the ability to empathize with (and recognize as legitimate) many sides of issues, and the development of mature social/emotional judgments both of self and of others. Using Thematic Apperception Test scores, the researchers found that seniors at the liberal arts institution had improved significantly in several areas compared to first year students in that institution, while seniors at the other two had either not altered their scores significantly from those of first year students in their respective schools or had changed significantly less. Important differences were found in the areas of critical thinking, intellectual flexibility, "Self-definition" and leadership motivation patterns, though there was no evidence of differences in creativity, concept attainment, need to achieve, or empathy with others.

Similarly, a study conducted for the Bell Telephone System by Beck (1981) found that Bell supervisors rated almost half (46%) of their employees with backgrounds in humanities or social sciences as having potential for success in middle management positions as contrasted to from one-quarter (26%) to one-third (31%) for employees with backgrounds in business and engineering respectively.

The former, on the average, maintained an eight year lead over the latter two.

These findings lend support to the concept that the humanities and social sciences should not be regarded as merely content courses whose presence provides students with personal enrichment or lends face validity to the granting of a degree. Rather, there are specific competencies that such studies enhance. Those competencies in the cognitive and affective areas are precisely those attributes essential to technological graduates, not at the primary entry level in their fields but as they seek to move up the hierarchy into managerial and supervisory levels.

Our second question addresses the "how" more than the "what". It is on a very practical level the question of curricular placement of humanities and social science courses in instructional programs of postsecondary institutions of technical and professional training. Surveys of conditions prevailing in several countries (e.g., Gould and Smith, 1968; Pace, 1974; ASEE, 1968 and 1983; SSIT/IEEE, 1991) show a wide diversity of approaches but also a significant tendency toward bifurcation between an emerging model of "instrumental" integration of subjects from humanities and social sciences with subjects from natural sciences and technology and a model of "parallel" segmentation where the two are kept apart throughout the curriculum.

Mikoiji and Plough (1988) suggest that the particular constellations may not be influenced only by pedagogical considerations but also by a multitude of "filters" such as curricular carrying capacity, occupational conventions, financial priorities, faculty availability, institutional inertia, contemporary social movements, and others. In terms of educational outcomes at a mid-size technical school of recognized standing in the United States, they found indications that instructional success in humanities and asocial sciences may well be associated with the students' majors, timing of exposure, and sociocultural background.

The first of these parameters is in line with the "relevancy theory in motivation; the correlations found can be used to argue in favor of an integrational model. (In national and localized sample surveys replicated over a twenty year interval, Vander Meer (1983) discerned considerable enthusiasm for specific courses in humanities and social sciences among engineering faculties although there was a decline in regard for "liberal arts" as such.)

The second parameter related to work on student readiness, the learning curve, and over-saturation aspects of modern learning theory. In essence, the findings imply that the earlier in the curriculum sequence the comprehensive integration is accomplished, the more advantageous will be the results.

The third parameter was seen as a "given" beyond the influence of educational institutions (cf. Potter, 1967; Katchadourian and Poli, 1985) which does not mean that their instructional policies can remain indifferent to it. Thus, our third question asking whether there are any indications that learning styles may differ among students who self-select for existing programs in traditional technological institution. A recent study by Reading-Brown and Hayden (1989) compared the learning styles of such undergraduates using a learning style inventory and a learning style questionnaire. Results indicated that while the learning styles of career-oriented students were relatively predictable, learning styles of students in non-career specific (liberal arts) college were not. Differences also were found in the learning styles based upon the majors chosen by the students. It would appear that students in career-oriented disciplines maintain learning styles that are more tangible and specific rather than generalizing and abstract.

These differences in learning styles might explain why exposure to humanities and social sciences produces significant increments in the cognitive and affective realms as cited previously. Perhaps the content and style in which these subjects are presented force students to a broader and more independent view of the world and of themselves, preparing them for managerial/supervisory positions which require flexibility and integrational views of the environment.

Such findings suggest that a synthesis is called for which would retain the advantages of traditional humanities and social sciences education while at the same time tailoring it somewhat to the learning styles of students who are majoring in technological subjects. One of the authors (Isaacs, 1973) for example, created an Introductory Psychology course utilizing the Personalized Student Instruction" (PSI) model (Keller, 1968; Johnston and Pennypacker, 1971) offered to students at a technological institution. This PSI model involves the use of microcomputers presenting hands-on psychological demonstrations that challenge the students to integrate on their own these demonstrations with the text material that is presented. The students proceed at their own pace with competency-based evaluations and immediate feedback, emphasizing self-responsibility for their progress

in the course. The course format has been continuously maintained for the past twenty-one years by different instructors following the pattern originally described, with student evaluations and objective tests showing long-term success both in terms of the students' objective learning in the course and in students' enjoyment of the course (Isaacs and Harnish, 1989; Isaacs and Hughes, 1975; Isaacs, 1973).

What is suggested here then is that there is a strong advantage to integrating offerings in the humanities and social sciences with technical and professional courses provided they are presented in an appropriate time sequence and format consistent with the learning styles of the students. These courses appear to provide educational inputs of value to the student beyond the immediate first job placement, focusing on characteristics necessary for future development of abilities and career advancement.

This also appears to be the principle behind the move to innovative post-secondary institutions called "Tech Prep", which is based on a rearrangement of instructional materials traditionally allocated to different domains and differing levels of the educational system. While not a totally comprehensive in-between stage straddled at the disjunction of middle and higher levels of the educational system, they tend to combine upper grades of secondary and much of the lower division of post-secondary curricula. In the United States they are exemplified by Ricci College Seattle Preparatory in the state of Washington and Simons Rock College in Massachusetts, but one is also reminded of the *Scuoa Unificata* movement in Italy and the *Gesammtschule* movement in Germany, and indeed in many respects the entire community college movement in the United States (AED, 1979; Adelman, 1983; Maeroff, 1983; Parnell, 1985).

Rehnke (1982-83, p. 2) states "When the tension between liberal learning and more practical education dips too heavily toward the side of pragmatism, students are not provided an education that lays the groundwork for a successful lifetime." Further research is called for that would seek out which aspects of the humanities and social sciences fosters these abilities, so that these might also be woven into the curriculum of individual schools in order to utilize their valuable influence.

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